

Exhibit A – Executive Summary

Commonwealth of Massachusetts

ExhibitAExecutiveSummaryMA.pdf

The Problem. Communities in MA must become more resilient to events such as the six presidentially declared disasters that occurred in 2011 to 2013. These events caused tremendous damage to infrastructure, housing, environment, and economies. Areas of low- to moderate-income households have found it especially difficult to recover. Seawalls, housing, and municipal infrastructure were damaged; beaches and riverbanks eroded; and areas de-vegetated. Compounding this need for resilience is the evidence that the climate has changed and is predicted to continue to do so. Temperatures are increasing, sea level is rising and precipitation is more extreme.

Threshold Criteria. To qualify for the National Disaster Resilience Competition, the MA Team demonstrates that 4 “target areas” in MA satisfy the HUD criteria of Most Impacted and Distressed and have Unmet Recovery Needs. These target areas are: Springfield, impacted by five of the disasters; a portion of Oak Bluffs, MA, impacted by Hurricane Sandy; and portions of Shelburne Falls (Buckland side) and Charlemont, impacted by Hurricane Irene. In addition, all of MA is a target area for resilience planning under this application.

Capacity of the Massachusetts Team. MA has assembled an experienced Team that is eager to assist communities in becoming more resilient. The MA Team, led by the MA Department of Housing and Community Development (DHCD) with project support from the Executive Office of Energy and Environmental Affairs (EEA), includes other state agencies, regional partners (including five regional planning agencies), not-for-profit organizations, universities and local municipalities.

Need and Extent of Problem. Coastal storms, land-bound hurricanes, snow storms, and tornadoes have all ravaged the state; they were particularly devastating to low- and moderate-income communities. Although federal relief funding has helped significantly, it has not covered the total cost of repairing and restoring the damage. The MA Team is committed to developing projects that address the post-disaster threats remaining as a result of existing unmet recovery needs and potential threat due to climate change. Team Members have been actively addressing these issues through the release of EEA’s 2011 Climate Change Adaptation Report, which evaluated strategies to adapt to predicted

climate change, and through the Coordinated Climate Preparedness Initiative and its numerous resiliency projects. It is time to envision and create a more resilient MA with anthropogenic and natural systems better equipped to cope with extremes and new climate change patterns.

Approach. To prepare for this Phase 1 application, the MA Team reached out to local, state, federal, nonprofit, university and private stakeholders. The consultations took the form of emails, phone calls, information sharing, site visits, meetings, and public hearings. Project ideas include: a Resilient Building Competition for property owners to ‘live with water’; an Energy Justice Program to enable low- and moderate-income populations to gain access to affordable clean energy; a Green by the Stream Program to encourage green infrastructure; a Plant a Tree Program to increase trees in rural and urban areas; an interactive Data and Mapping Tool to help communities visualize climate change, and; a Sharpen the Science effort to produce the latest climate science for MA.

Leverage and Commitments. Committed resources by the MA Team will broaden the reach of our resiliency objectives beyond our target areas throughout the Commonwealth. They include the state’s Community Clean Energy Resiliency Grants, Dam/Seawall Repair and Removal Grant and Loan Fund, and Coastal Community Resilience and Green Infrastructure Grant Programs.

Form HUD2995. Form HUD2995 verifies that this application meets program requirements and supports local Preferred Sustainability Status (DropBox/Exhibit E/PreferSustainCommStatus.pdf).

Link to DropBox/Exhibit B:

https://www.dropbox.com/sh/nq9330sofy2yfv1/AAB_tdO0T4tQXH69rppTGoqoa?dl=0

Link to DropBox/Exhibit D:

<https://www.dropbox.com/sh/da97xghx59d3rqy/AACNNT80cLugvnN7JG3UP6Y8a?dl=0>

Link to DropBox/Exhibit E:

https://www.dropbox.com/sh/5csxkn0vzdtox5f/AACoIEeaEy_fhpap8DGUYffca?dl=0

Link to DropBox/Exhibit F:

https://www.dropbox.com/sh/k1x7vq7yn10hkcy/AACEEuEnxHpSV1Kyz2yK_GGGa?dl=0

Exhibit B – Threshold Requirements

Commonwealth of Massachusetts

ExhibitBThresholdRequireMA.pdf

Link to DropBox/Exhibit B:

https://www.dropbox.com/sh/nq9330sofy2yfv1/AAB_tdO0T4tQXH69rppTGoqoa?dl=0

EXHIBIT B – THRESHOLD REQUIREMENTS

Meet General Section Administrative Threshold: All 4 target areas meet the Threshold requirements outlined in HUD's FY2014 NOFA for Discretionary Programs.

Eligible Applicant: Commonwealth of Massachusetts

Eligible County: Hampden County in MA

Eligible Activity: Massachusetts will demonstrate that each CDBG-NDR activity proposed is an eligible activity or will request an eligibility waiver for the activity with the Phase 2 application.

Incorporate Resilience: Massachusetts incorporated resilience into its project approach, applied resilience in projects listed in Exhibit G, and will incorporate resilience in all Phase 2 projects.

Meet a National Objective: Massachusetts will meet a CDBG-NDR national objective (low- and moderate-income, slum or blight or urgent community development need) in each Phase 2 activity, with the exception of general administration and planning which is exempt from this requirement, or will request and receive a waiver from HUD.

Meet Overall Benefit: At least 50% of the NDRC funds requested in Massachusetts's Phase 2 application will benefit low- and moderate-income populations in the form of services, area benefit, housing, or jobs in order to meet the national objective of benefit to low- and moderate-income persons, or MA will request and receive a waiver from HUD.

Establish Tie-Back: Any activity in the Massachusetts Phase 2 application will have a direct tie-back to the six qualified disasters in Massachusetts between 1/1/2011 and 12/31/2013.

One Application per Applicant: Commonwealth of Massachusetts will submit one application.

Execute Certifications: All required certifications can be found in Attachment C.

Target Area #1: City of Springfield in Hampden County, Massachusetts

1. Most Impacted and Distressed Characteristics: Springfield (Attachment E: Figure B-1) is in Hampden County, a most impacted/distressed County in HUD's App. A.

1.1 Most Impacted Characteristics

1.1.1 Housing. The June 2011 tornado significantly impacted Springfield's housing. 255 residential structures and 615 residential units were damaged and condemned. In Feb. 2015, the City identified 40 housing units with serious damage that were subsequently demolished (exceeding HUD's threshold of 20). 14 units were owned by the Springfield Housing Authority (SHA) and 26 by Hill Homes Cooperative (HUD 202 housing). See Dropbox\Exhibit B\ for affidavits of damage for the 40 addresses (SpringHouse1.pdf, SpringHouse2.pdf); and property photos (Attachment E: Figure B-5 through Figure B-9).

1.1.2 Infrastructure. The 2011 June Tornado devastated the City, eliminating trees and other vegetation, and the Halloween Storm damaged the city's permanent public infrastructure and resulted in 150 FEMA project worksheets. The total amount of obligated recovery funds is \$80M. Springfield documented damage to permanent public infrastructure exceeded \$2M. Infrastructure Impacts due to Debris was \$2,669,830. Damage to the City's Flood Control Drainage System on Riverside Road was \$6,000,000. See Dropbox\Exhibit B\ for stamped engineering reports certifying damage estimates for these projects (SpringInfra1.pdf, SpringInfra2.pdf).

1.1.3 Environmental Degradation. The tornado de-vegetated a large swath of the City, and the snowstorms decimated additional vegetation. Stormwater runoff, and road and stream flooding have increased, leading to increased vulnerability to the City's residents, businesses, economy, and environment. Damage to the Van Horn Dam, Watershops Pond, Debris Removal and Drainage/Culvert Repair is \$2,770,000, exceeding HUD's threshold of \$400,000. See Dropbox\Exhibit B\ for an

engineering report summarizing damage (SpringEnviro1.pdf); and supporting documentation (SpringEnviro2.pdf, SpringEnviro3.pdf, and SpringEnviro4.pdf).

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate-income households. 65.71% (more than 50%) of the residents of the Springfield sub-county area are at less than 80% of the area median income (AMI).

2. Unmet Recovery Needs

2.1 Housing

In a windshield survey conducted in February 2015, Springfield identified 14 units owned by the Springfield Housing Authority (SHA) and 26 owned by Hill Homes Cooperative (HUD 202 housing) that were severely impacted by the 2011 tornado, and subsequently demolished. The replacement cost for the 14 units owned by the Springfield Housing Authority is \$3,780,000. With \$1,572,700 in committed funds; this leaves an unmet need of \$2,207,300. The replacement cost for 26 units of HUD 202 housing, the Hill Homes cooperative is \$17,262,465. The development has \$14,788,621 in funding identified, but an unmet need of \$2,473,845. See Dropbox\Exhibit B\ for affidavits of damage and insufficient funding from insurance, FEMA, and SBA for the 40 addresses, as identified by the City of Springfield during the February 2015 windshield survey (SpringHouse1.pdf, SpringHouse2.pdf); photos of these properties (Attachment E: Figure B-5 through Figure B-9); and a MID-URN checklist (SpringMID-URNchecklist.pdf). Damage exceeds HUD's threshold that a list 20 addresses of units with remaining damage be provided and that at least 9 of these addresses be surveyed to confirm the damage was due to the disaster and there are inadequate resources from insurance/FEMA/U.S. Small Business Administration for completing repairs.

2.2 Infrastructure

FHWA/FEMA provided \$2,243,855 of the needed \$2,669,830 in funding for Infrastructure Impacts due to Debris; unmet need is \$425,975. Storm runoff severely damaged the City's Flood Control

Drainage System on Riverside Road, which needs to be upgraded or replaced. The project cost is \$6,000,000 and with \$50,000 from the City, unmet need is \$5,950,000. Total infrastructure unmet need is \$6,375,975. See Dropbox\Exhibit B\ for stamped engineering reports with sources and needs statements (SpringInfra1.pdf, SpringInfra2.pdf), and a MID-URN Checklist (SpringMID-URNchecklist.pdf).

2.3 Environmental Degradation

Funding needed to repair the Van Horn Dam, Watershops Pond, Debris Removal and Drainage/Culvert Repair is \$2,770,000. With \$150,000 of funding available from the City, unmet need for environmental degradation is \$2,620,000. See Dropbox\Exhibit B\ for an engineering report and a sources and uses statement (SpringEnviro1.pdf); supporting documentation including an Upper Van Horn Reservoir Dam Inspection/Evaluation Report (2009) (SpringEnviro2.pdf), an Inspection/Evaluation Report of the Watershops Pond Dam (2013) (SpringEnviro3.pdf), a report on Vegetative Debris Removal (2011) (SpringEnviro4.pdf); and a MID-URN Checklist (SpringMID-URNchecklist.pdf).

2. 4 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

MA Department of Housing and Community Development (DHCD) received \$7,210,000 in FY13 CDBG-DR funds of which a minimum of \$1,388,800 must be spent in Hampden County. \$5,960,134 has been spent, allocated, or recommended for approval, including \$1,496,535 in Hampden County (see MA's FY13 CDBG Action Plan: (<http://www.mass.gov/hed/docs/dhcd/cd/cdbg-dr/s-111-cdbgdractionplanjan2015.pdf>)). See DropBox/Exhibit B/Spring-MACDBG.pdf for a letter from Mr. Cignoli stating that MA's remaining CDBG-DR funds of \$1,249,866 are insufficient to meet the City's unmet needs of \$6,375,975 for infrastructure and \$2,620,000 for environmental degradation.

Target Area #2: Oak Bluffs sub-county area, Census Block Groups #250072002001 and 250072002004 (“Oak Bluffs target area”). See Attachment E: Figure B-2 for target area and damage.

1. Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

1.1.1 Infrastructure

Hurricane Sandy caused significant damage to the historic town of Oak Bluffs, located on Martha’s Vineyard. Road wash-out, bulkhead damage and coastal erosion from Hurricane Sandy caused damage to permanent infrastructure in Census Block Groups #250072002001 and #250072002004 at an estimated cost exceeding \$2M. North Bluff Seawall was damaged; repairs have been funded by MA Seaport Advisory Council (\$2M) and EEA Dam and Seawall Repair and Removal Fund (\$3.6M). (See DropBox/Exhibit B for OakBluffsInfra1.pdf and OakBluffsInfra2.pdf for documentation demonstrating payment of \$3.6M by EEA.) The town paid \$40,228.65 to repair cracking asphalt and the eroding shoulder of Lower East Chop Rd. It also paid \$72,000 to stabilize the bulkhead damage at East Chop Rd and Seaview Avenue and \$75,000 to stabilize damage to the cliff on East Chop Drive. Existing damage to a wood bulkhead on East Chop Rd and Seaview Ave is estimated at \$664,588.00 and existing damage to the cliff embankment on East Chop Drive is estimated at \$4,119,508 exceed \$2M. See Dropbox\Exhibit B\Oak Bluffs\Infrastructure for FEMA Worksheets documenting damage to East Chop Rd/Seaview Ave and to the cliff embankment on East Chop Drive (OakBluffsInfra3.pdf and OakBluffsInfra4.pdf).

1.1.2 Environmental Degradation

Erosion of Oak Bluffs Town Beach (Pay/Inkwells Beaches) and erosion that clogged the inlet to nearby Sengekontacket Pond during Hurricane Sandy occurred outside of, but proximate to, Census Block Groups #250072002001 and #250072002004, and greatly affected residents and businesses of that area. The beach, is within walking distance of many of the low- and moderate-income residents in

these Census Block Groups, nearest to the Steamship Authority in Oak Bluffs, and is an important tourist destination and critical to the local economy. Clogging of the pond negatively impacted shellfish habitat, thereby affecting a food supply and the livelihoods of local residents. Combined damage to the environment was \$1,718,370, which exceeds the HUD threshold of \$400,000. See Dropbox\Exhibit B\ for FEMA Worksheets documenting damage to Pay/Inkwell Beaches and to Sengekontacket Pond inlet (OakBluffsEnviro1.pdf and OakBluffsEnviro2.pdf).

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate-income households. More than 50% of the residents of the Oak Bluffs sub-county area earn less than 80% of the area median income (58.57% of AMI in Census Block Group #250072002001 and 52.94% of AMI in Census Block Group #250072002004).

2. Unmet Recovery Needs

2.1 Infrastructure

Unrepaired damage to a wood bulkhead on East Chop Rd and Seaview Ave is \$664,588.00; unrepaired damage to the cliff embankment on East Chop Drive is \$4,119,508 (Figure B-2). There are no funds available to repair damage for either project. Total unmet recovery need for infrastructure is \$4,784,096. See Dropbox\Exhibit B\ for 2 FEMA Project Worksheets (OakBluffsInfra3.pdf and OakBluffsInfra4.pdf); a letter from the town's engineer, CLE Engineering, with 2 sources and uses statements that supplement the FEMA worksheets (OakBluffs-MACDBG.pdf); a Release Deed to Confirm Ownership verifying that Oak Bluffs owns the parcel on East chop Drive where \$4,119,508 in damages were incurred (OakBluffsInfra5.pdf); and a MID-URN summary checklist (OakBluffsMID-URNchecklist.pdf).

2.2 Environmental Degradation

Damage to Pay/Inkwells Beaches during Hurricane Sandy was \$1,165,284 and at Sengekontacket Pond was \$553,086, totaling \$1,718,370 (Figure B-2). No funding is available to pay for damage to

Pay/Inkwells Beaches; unmet need is \$1,165,284. The town paid \$21,780 to conduct initial dredging of Sengekontacket Pond inlet; the unmet need is \$531,306. Total unmet need due to environmental damage is \$1,696,590. See Dropbox\Exhibit B\ for 2 FEMA worksheets (OakBluffsEnviro1.pdf and OakBluffsEnviro2.pdf); a letter from the town's engineer, CLE Engineering, with 2 sources and uses statements that supplement the FEMA worksheets (OakBluffs-MACDBG.pdf); and a MID-URN summary checklist (OakBluffsMID-URNchecklist.pdf).

2.3 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 in FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (See updated FY13 CDBG Action Plan). The Oak Bluff target area's total unmet need of \$6,480,686 (\$4,784,096 for infrastructure and \$1,696,590 for environmental degradation) greatly exceeds the remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state. See Dropbox\Exhibit B\ for a letter from CLE Engineering stating that the Commonwealth's remaining CDBG-DR funds of \$1,249,866 are insufficient to meet the town's unmet recovery needs of \$6,480,686 (OakBluffs-MACDBG.pdf).

Target Area #3: Shelburne Falls (Buckland portion), MA sub-county area, Census Block Group #250110415023 (“Shelburne Falls/Buckland target area”) is located in the northeast area of the Town of Buckland and includes the Buckland side of the Village of Shelburne Falls. See Attachment E: Figure B-3 for target area and damage.

1. Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

1.1.1 Environmental Degradation

Hurricane Irene caused stream bank erosion starting near the Canadian border and extending through Vermont, New Hampshire, Massachusetts and Connecticut, causing significant nonpoint source pollution in the Connecticut River watershed, including its tributaries (i.e. Deerfield and Westfield Rivers) and in Long Island Sound (<http://earthobservatory.nasa.gov/IOTD/view.php?id=52059>). The 2,200 residents of the Village of Shelburne, including those of the Shelburne Falls/Buckland target area, are served by the Shelburne Falls Fire District, a water supplier with wells along the North River (a tributary to the Deerfield River watershed) in Colrain, north of Census Block Group #250110415023. Hurricane Irene flooded the Fire District’s wells and severely eroded the river bank and land around the wells, which were off-line for 7 days following the storm. Damages were \$460,000, exceeding HUD’s threshold of \$400,000 (DropBox/Exhibit B/ShelFallsEnviro1.pdf). The wells are vulnerable to future flooding and will be a complete loss unless the river bank is stabilized and the well heads are raised. MA State Geologist, Steve Mabee (a UMass partner on this application), with New England Environmental, Inc., developed prototype Fluvial Erosion Hazard Maps of portions of the Deerfield River Basin with FEMA Hazard Mitigation Grant Program funding of \$70,211. Four prototype maps were prepared for 27 miles of stream in the Deerfield River basin affected by Tropical Storm Irene, including one for the East Branch of the North River in Colrain. The maps provide municipal planners with a tool to prioritize maintenance or mitigation at areas subject to fluvial

erosion. Another project partner, FRCOG, received a Section 604b grant from MA Department of Environmental Protection (an EEA agency) of \$61,200, matching it with an additional \$4,507 for a total of \$65,707. This project involved a geomorphic assessment and a fish community/physical habitat survey of the North River, solutions to channel instabilities, and conceptual restoration designs.

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate-income households. More than 50% (57.28%) of the residents of the Buckland portion of Shelburne Falls (Census Block Group #250110415023) are at less than 80% of AMI.

2. Unmet Recovery Needs

2.1 Environmental Degradation

Restoration of damage to the Shelburne Falls Fire District well site along the North River in Colrain (Figure B-3) will cost \$460,000, based on a design by Field Geology Services. The project includes establishing a riparian buffer and stabilizing the stream bank with a constructed bankfull bench, boulder deflectors, and toe wood structures along 700 feet of eroding bank. No funding is available to pay for restoration of damage to the Shelburne Falls Fire District well site along the North River in Colrain; unmet need of environmental degradation is \$460,000. See Dropbox\Exhibit B\ for supporting documentation describing the improvements needed to the environment in the vicinity of the Shelburne Falls Fire District's wells. This includes a report from Field Geology Services (ShelFallsEnviro1.pdf), one sources and uses statement (ShelFallsEnviro2.pdf), and a MID-URN summary checklist (ShelFallsMID-URNchecklist.pdf).

2.2 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 in FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (See updated FY13 CDBG Action Plan for MA). The Shelburne Falls/Buckland target area unmet need of \$460,000 for environmental degradation is less than the

remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state. However, it is higher than the HUD threshold of \$400,000. Assuming that either the Springfield or Oak Bluffs target area is accepted by HUD, then the unmet need in one of those areas plus the unmet need in the Shelburne Falls/Buckland target area far exceeds DHCD's remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state.

Target Area #4: Charlemont sub-county area, Census Block Group #250110401001 (“Charlemont target area”). See Attachment E: Figure B-4 for target area and damage.

1. Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

1.1.1 Infrastructure

On August 28, 2011 extreme rainfall from Hurricane Irene resulted in severely high flows in the Deerfield River, causing significant damage to roads owned by MassDOT and the town of Charlemont. Nine repair projects were conducted in Charlemont on MassDOT’s or the town’s roadways using funding from the Federal Highway Administration. They were:

- Rte. 2 MM 26 to 29.5, Repair road, slope; clean debris; approaches to Trout Brook, \$150,000
- Rte. 2 MM 25.5 to 29.0, Channel clearance to protect walls and roadway, \$100,000
- Tower Road Bridge, Clear debris on inlet side of bridge, \$75,000
- Zoar Road Bridge, Deck repair, detour route for Route 2, \$100,000
- Rt. 8A, Slope repairs and road repairs, \$94,000
- North River Road, Slope repairs and road repairs, \$24,000
- South River Road, Slope repairs and road repairs, \$441,000
- Route 2, Project 606605 - Roadway Stabilization, \$2,184,548
- Route 2, Project 606606 - Retaining Wall Replacement, \$2,463,556

Damage caused the closure of Route 2, which provides a critical economic and transportation function, connecting residents to jobs across northern MA and connecting western portion of the state to the eastern portion. The total spent by FHWA to repair roads in Charlemont that were damaged by Hurricane Irene was \$5,632,105 (see Dropbox\Exhibit B\ CharleInfra1.pdf for verification from MassDOT that it was reimbursed \$5,632,105 by FHWA for damage to roadways in Charlemont caused by Hurricane Irene), which exceeds the HUD threshold of \$2M. See Dropbox\Exhibit B\

CharleInfra2.pdf for several reports in which the Federal Highway Administration inspected and approved cost overruns related to MassDOT Project 606605 – Charlemont & Savoy, Emergency Roadway Stabilization on Route 2 from MM 23.5 (F-05-005) to MM 27.4 (C-05-024 RR Bridge). The amount spent in Charlemont doing repair work under this contract was \$2,184,548 (from CharleInfra1.pdf). See CharleInfra3.pdf for pay reports for MassDOT Project 606606 – Charlemont & Savoy, Emergency Repair & Reconstruction of Retaining Walls along Route 2 from MM 23.5 (F-05-005) to MM 27.4 (C-05-024 RR Bridge). The first few pages of this document have a cost breakdown that shows \$2,463,556 in retaining wall repair work in Charlemont.

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate-income households. More than 50% (52.72%) of the residents of the Charlemont sub-county area (Census Block Group #250110401001) are at less than 80% of AMI.

2. Unmet Recovery Needs

2.1 Infrastructure

A total of \$150,000 in FHWA funds were used to repair the severe damage to the culvert on Route 2 in Charlemont over Trout Brook (CharleInfra1.pdf, Figure B-4). However, because the repair work was performed using FHWA funds, the work allowed was limited to only that necessary to restore the pre-Hurricane Irene condition. While the culvert at this location is in good condition, it is undersized and has a stone-lined channel bottom. The smaller culvert span restricts natural stream flow, particularly during floods, causing other problems including scouring, erosion and high flow velocity. Clogging of the culvert caused washout during Hurricane Irene; this could happen again unless the culvert is re-sized. To fully meet the unmet need of this disaster, the culvert must be replaced with a large enough structure to pass fish, wildlife and high flows, thereby preventing adverse impacts to important transportation routes and the ecological system. There are no funds available to upgrade the culvert at

Route 2 and Trout Brook to avoid future failure and resulting damage to infrastructure and environment. Therefore, the unmet recovery need is the total project cost of \$1,167,000. See Dropbox\Exhibit B\ for an engineering report (CharleInfra4.pdf), a sources and uses statement (CharleInfr5.pdf), and a MID-URN summary checklist (CharleMID-URNchecklist.pdf).

2. 2 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 in FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (See updated FY13 CDBG Action Plan). The Charlemont target area unmet need of \$1,167,000 for infrastructure damage is less than the remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state. However, it is higher than the HUD threshold of \$400,000. Assuming that either the Springfield or Oak Bluffs target area is accepted by HUD, then the unmet need in one of those areas plus the unmet need in the Charlemont target area exceeds DHCD's remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state.

Exhibit C – Capacity

Commonwealth of Massachusetts

ExhibitCCapacityMA.pdf

Grant Oversight and Management Capacity

Massachusetts Executive Office of Housing and Economic Development's Department of Housing and Community Development (DHCD) provides oversight of this contract and its implementation while the MA Executive Office of Energy and Environmental Affairs (EEA) will provide day-to-day management of grant activities. DHCD strengthens cities, towns and neighborhoods and enhances quality of life by providing leadership, professional assistance and financial resources that promote affordable housing, economic vitality of communities and sound municipal management. DHCD is responsible for all MA programs and financial opportunities related to affordable housing, business improvement, community economic development, and community services. It has the relevant project management, quality assurance, financial and procurement, and internal control capacity to quickly launch and implement a major project. DHCD administers HUD's Community Development Block Grant (CDBG) program as well as several other programs benefitting municipalities, private entities, and residents, including low- and moderate-income wage earners. EEA is the Secretariat for the state's 6 environmental and energy agencies, and has extensive expertise in environmental protection and restoration, clean energy, data analysis, water, coastal issues, habitat, recreation, agriculture, forestry, land, fisheries/wildlife, community engagement, design and engineering. The staffs of EEA and its agencies have extensive experience in climate-related science, planning, implementation; EEA developed the state's first Climate Change Adaptation Report. EEA regularly engages stakeholders in participatory policy and project development through its policy office and agency staff. In addition, EEA and its agencies have considerable experience grant and loan administration and oversight.

Partnership Capacity

DHCD, EEA and other state agencies have vast experience coordinating with federal, state, regional, local and private partners. They regularly collaborate on cross-disciplinary issues and work closely with the 351 municipalities across MA. The MA Team has the experience to immediately launch and implement a major effort in Phase 2. Team members offer strong experience in areas such as data

analysis, public works, affordable housing, environmental quality, planning, community engagement, design and engineering, and economic revitalization. If a team member cannot participate, the MA Team has enough depth that another member with similar expertise will be able to fill that gap. Staff from EEA wrote this application.

Cross-Disciplinary Technical Capacity

The MA Team offers multi-disciplinary expertise with state and local government, regional organizations, and academia. Partnership letters can be found in Attachment A.

Leadership Team

DHCD will provide administrative responsibility and ensure that activities under the grant comply with HUD requirements. *DHCD* has expertise in affordable housing, economic revitalization, economic development, community engagement, and data analysis. *EEA* has expertise in climate change adaptation and mitigation, project scope development, and grant and loan management. It will take the lead role in developing projects and preparing the Phase 2 application and will work with partners and stakeholders to ensure proper project implementation.

MA State Agency Partners

MA Department of Transportation (MassDOT) will implement all projects related to the state transportation infrastructure and will provide technical advice on matters related to highways, bridges, culverts, public transit, infrastructure vulnerability assessments and protection, data analysis, public works, environmental quality, community engagement, design and engineering. *MA Department of Public Health (DPH)* will work with local communities and their vulnerable populations on issues such as air quality, heat stress, emergency shelter, and communication strategies. *MA Emergency Management Agency (MEMA)* will provide expertise related to emergency response and disaster recovery through planning, training, and communications. *MA Historical Commission* identifies, evaluates, and protects important historical and archaeological assets and will provide expertise in ensuring resiliency of historic buildings.

Regional Planning Agencies/Regional Partners

Franklin Regional Council of Governments (FRCOG, 26 communities of Franklin County), Pioneer Valley Planning Commission (PVPC, 43 communities in Hampden and Hampshire counties), Berkshire Regional Planning Commission (BRPC, 32 communities in Berkshire County), Metropolitan Area Planning Council (MAPC, 101 communities in eastern MA), and Martha's Vineyard Commission (MVC, 7 towns of Martha's Vineyard and Gosnold) are regional planning agencies (RPAs) with expertise in planning, environmental quality, energy, emergency preparedness, transportation, housing, economic development, health, data analysis, public works, and community engagement. MAPC, PVPC, BRPC and FRCOG offer extensive experience building on their recently completed 3-year HUD Sustainable Communities regional planning grants. They strengthen the MA Team with innovative approaches to community outreach and engagement via public meetings, workshops, charrettes, surveys and other community involvement. MVC's interests include sea level rise and it has regulatory authority in 6 towns. *MA Association of Conservation Districts* will be a liaison to local conservation districts and provide community engagement, technical assistance on conservation planning and education, soil surveys, tree seedling sales, training, sediment/erosion control technical assistance, environmental quality, design and engineering. *MA Land Trust Coalition* will provide land conservation technical services where conservation of buffers can improve flood control and resiliency and will be our liaison to land trusts and conservation organizations in MA. *NESCAUM*, a not-for-profit organization providing scientific, technical, analytical, and policy support to the air quality and climate programs of the 6 New England states, New Jersey, and New York, will provide expertise related to the development of a climate science clearinghouse to provide decision-makers and practitioners with access to data and analytical tools to assist with climate change planning. *Massachusetts Bays National Estuary Program (MassBays)*, an EPA National Estuary Program dedicated to protecting, restoring, and enhancing the estuarine resources of MA and Cape Cod Bays,

will facilitate partnerships, convene stakeholders, and provide scientific basis for management decisions.

Universities

University of Massachusetts (UMass) at Amherst and Boston will provide expertise in scientific research, engineering, fisheries/wildlife, planning, natural systems, water, infrastructure, urban planning and design, public policy, coastal and ocean sciences, data collection and analysis, computer modeling, climate science, development of scientific information and tools, and includes: at UMass Amherst: the Massachusetts State Geologist; Departments of Geosciences, Environmental Conservation, and Civil and Environmental Engineering; MA Water Resources Research Center, and the federally supported Northeast Climate Science Center (NECSC); and at UMass Boston: the School for the Environment and several associated research facilities. *University of New Hampshire (UNH)* will provide data analysis, computer modeling of climate change effects, engineering, design and engineering, and public engagement, particularly around sea level rise, coastal surge, and downscaled precipitation and temperature predictions for climate change.

Community Organizations

The Valley Opportunity Council, a non-profit organization that works through-out Hampden County to lift families out of poverty, will work with partners in implementing planning and analysis, and infrastructure improvements to assist affected communities in Hampden County. *MA Rivers Alliance* will assist in engaging local watershed associations on issues related to environmental quality, data analysis, public works, public education, community engagement, and watershed restoration and protection. *The Boston Harbor Association* uses environmental quality, data analysis, public works, education, community engagement to promote restoration and protection of, and access to Boston Harbor and will assist in engaging local businesses, municipalities and residents, particularly on sea level rise and surge.

Municipalities

As Partners, the *City of Springfield* and *Town of Oak Bluffs* will guide projects in their communities.

Federal Agency Partners

Although federal agencies cannot be partners, several have indicated their support of the Commonwealth's application and their intent to provide support as it implements its resiliency plan. The *U.S. Environmental Protection Agency (EPA)* will facilitate communication with other New England states, and will bring experience from its Community-Based Water Resiliency initiative, its Sustainable Communities initiative with HUD and U.S. DOT, and environmental protection. *U.S. Geological Survey (USGS)* will research natural resources; undertake data collection, analysis, and computer modeling; develop scientific information, tools, and techniques. *USDA Natural Resources Conservation Service (NRCS)* will provide community engagement and technical assistance to farmers and forest land owners, data analysis, design and engineering.

Multi-Disciplinary Capacity

Nearly every major decision or project conducted by the state requires substantial coordination among affected parties. Past partnerships between state agencies have been strong. Each Team Partner has considerable experience working on projects with stakeholders that include federal, state and local levels of government; academia; regional planning organizations; consulting engineers; not-for-profit organizations; and local residents. Partners have a history of closely coordinating with each other to ensure that their activities are synchronized. As an example, the Global Warming Solutions Act requires MA to reduce greenhouse gas emissions. Led by EEA, the effort engages multiple agencies including MassDOT, EOHED, DPH, and a multi-disciplinary advisory committee representing electric utilities, regional planning agencies, developers, environmentalists, and academicians.

Comprehensive Planning and Complex Program Capacity

Members of the MA Team regularly implement large, complex projects. EEA and its agencies oversee many large grant programs, administering hundreds of millions of dollars in funding for land

conservation, upgrades to water and wastewater infrastructure, dam and seawall removal and repair, green infrastructure, coastal resiliency, urban park, and more. MassDOT conducts long-term planning for development and upgrades to airports, subways, and highways. Collectively, the 5 RPA partners conduct a range of planning and implementation activities with 200 of the state's 351 communities, including environmental, housing, economic development, and transportation.

Technical Capacity to Identify and Assess Science-Based Information

EEA and its agencies have planners, engineers, and scientists with technical capabilities in coastal issues; infrastructure; energy; water resources; pollution and infrastructure; parks and recreation; agriculture; and fisheries and wildlife. UMass-Amherst is host to the NECSC, part of a federal network of 8 Climate Science Centers, which provides scientific information, tools, and techniques related to land, water, wildlife and cultural resources. With its partners, College of Menominee Nation, Columbia U, Marine Biological Laboratory, U of Minnesota, U of Missouri Columbia, U of Wisconsin-Madison, and U.S. Department of Interior agencies, NECSC provides resources for meeting regional needs for climate impact science assessment, education and stakeholder outreach. The MA Team also includes climate researchers, scientists and engineers at UMass Boston and UNH. Other partners work closely with scientists to assess the potential impacts and vulnerabilities of climate change. MassDOT is working with UNH and UMass-Boston to assess vulnerabilities of its infrastructure to sea level rise and coastal surge. Using the results of sophisticated computer modeling, MassDOT is developing alternative strategies to address these impacts, taking into consideration cost, timeframe of impact, project life, and risk. The Boston Harbor Association, in collaboration with the same scientists, published [Preparing for a Rising Tide](#), an examination of the effects of projected sea level rise and coastal surge in Boston.

Civil Rights and Fair Housing Experience

DHCD is committed to creating fair and open access to affordable housing and promoting compliance with state and federal civil rights obligations. In its Affirmative Fair Housing Marketing and Resident

Selection Plan Guidelines, DHCD requires that all privately assisted housing or housing for inclusion on the Subsidized Housing Inventory have an Affirmative Fair Housing Marketing and Resident Selection Plan. With respect to rental housing and Assisted Living Facilities, the affordable Use Restriction documents of said housing must require that the AFHMP, subject to the approval of the subsidizing or funding agency, shall be implemented for the term of the affordability restriction. DHCD has published its Affirmative Fair Housing and Civil Rights Policy and Fair Housing Mission Statement and on its website, lists Principles and Resources for Fair and Affordable Housing in MA. In its Analysis of Impediments to Fair Housing Choice (2014), DHCD analyzes racial and economic disparities, including chapters on The Foreclosure Crisis and Impacts on Families and Neighborhoods of Color and Development with Rental Subsidies for Extremely Low Income Households.

Environmental Justice (EJ) is a high priority in MA. EEA's Secretary issued the state's first-ever EJ Policy in 2002. In November 2014, the Governor issued an Executive Order requiring EEA to update its EJ Policy, creating a new position and an Advisory Council to advise on EJ policies and practices. MA invests significantly into its 26 "Gateway Cities," including Springfield, defined as having median household incomes below the state average, populations greater than 35,000 and less than 250,000, and rates of educational attainment of a bachelor's degree (or higher) that are below the state average. MA's vision is that Gateway Cities actively participate in, and contribute to, the Commonwealth's overall economic success by taking advantage of their distinctive ability to be desirable locations for innovators, entrepreneurs and businesses and places where people choose to live.

Design Quality Capacity

To ensure that Phase 2 includes a design quality that enhances long-term resilience, the MA Team will create an advisory group to assess climate change projections and provide advice on sound, resilient design. In September 2015, NOAA will finalize Atlas 14 Volume 10, an analysis of precipitation frequency that will update Technical Paper 40 (published in 1961). Rainfall frequency has intensified

significantly since 1961; today a 100-year 24-hour storm in MA is estimated to be 8.0 to 8.5 inches compared to 6.5 inches. The lower rainfall is currently used in our federally funded highway projects, leading to under-sized drainage systems that compromise roads and culverts during intense rain. Once the Atlas is finalized, it will be included in updated design standards, the MA Stormwater Handbook, and possibly an updated MA Stream Crossings Handbook, which provides guidance on minimizing impacts to aquatic habitat while constructing roadways. The MA Team's capacity to design or plan for long-term resilience is informed by our Partners, especially those who are able to help translate climate science into usable, practical design standards, including NECSC, UMass, UNH, and MassDOT.

Capacity to Determine Reasonable Cost

DHCD, EEA and MassDOT are highly experienced in soliciting and reviewing bids for complex projects with large budgets and selecting contractors based on the combination of their abilities to successfully complete the job at the lowest cost, following state law on bidding procedures. EEA's agency Department of Conservation and Recreation administers FEMA's Hazard Mitigation Program and MassDOT is familiar with cost efficiency analyses. In an especially complicated and costly project, the state agencies may also consider using a value engineering consultant to assess and reduce project costs while ensuring that the project will function as intended.

Community Engagement Capacity

The MA Team has strong experience engaging community stakeholders and is committed to implementing a robust public process throughout this project. All state agencies coordinate closely with stakeholders, engaging them during development of strategies and approaches. EEA convened over 200 stakeholders in the development of the 2011 MA Climate Change Adaptation Report, and met with stakeholders over 5 years, and held over 50 committee and workgroup meetings and several targeted stakeholder meetings to develop the Sustainable Water Management Initiative (SWMI). Also, four planning agency partners recently completed 3-year HUD Sustainable Communities regional planning grants that emphasized and relied on extensive and innovative community outreach and

engagement. Techniques included innovative meeting design, open houses, public meetings, workshops, charrettes, surveys and participatory technology. Special efforts were made to engage nontraditional planning partners and vulnerable populations including residents with limited English proficiency and renters during these planning processes. In the past year, EEA, FRCOG, BRPC, and Franklin Land Trust completed 23 public meetings across the Deerfield and Hoosic watersheds and formed a 20-town advisory committee with representatives from each town and 8 regional environmental and business organizations that are meeting to complete a regional conservation and economic development plan. EEA's Office of Coastal Zone Management (CZM) StormSmart Coasts program engages local officials and property owners, providing information, strategies, and tools to help communities and people working and living on the coast address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts. CZM publishes technical guidance, conducts pilot projects, and provides funding to enable floodplain management along the coast, reduce coastal erosion and storm damage while minimizing impacts to the shoreline and neighboring properties, and conduct vulnerability assessments.

Throughout development of this Phase 1 proposal, the MA Team has sought stakeholder involvement through 2 public hearings, a written comment period, meetings, emails and telephone calls. An even more robust process is planned for the Phase 2 proposal, when the MA Team will have another public notification period during which stakeholders will offer additional candidate target areas. The Team will work with target areas to develop projects for inclusion in the Phase 2 application. During Phase 2, the Team will create a multi-disciplinary, multi-stakeholder advisory group to share information, enhance planning efforts across multiple jurisdictions, share resources, and foster better understanding of climate predictions, impacts and tools for better implementation of resiliency and mitigation efforts. The Team will also facilitate project-specific stakeholder involvement, drawing from its extensive experience of stakeholders to ensure that projects are effective and beneficial to communities.

Capacity to Work with Community Leaders

DHCD and EEA have completed hundreds of HUD CDBG and park construction grants, respectively, over the past several years. The agencies have sought partnerships with all types of community leaders, ranging from the city mayors and state representatives to community-based organizations. The MA Team is experienced in implementing complex and controversial projects that involve divergent points of view and the need to work with affected parties to develop solutions amenable to all.

Regional or Multi-Governmental Capacity

Drawing from the experience of the state agencies; the five regional planning agencies that represent 200 Massachusetts communities; and NESCAUM with affiliations with other New England states, New York, and regions of Canada; and federal agencies, the Team has a strong capacity to work regionally, extending well beyond its target areas. Team members can reach large regional audiences, as demonstrated by the 4 HUD Sustainable Regional Plans that used grassroots engagement to address regional land use, natural resources, economic development, equity, and infrastructure problems. The Deerfield/Hoosic natural resources and economic development initiative reached large regional areas using grassroots and involved coordination of 2 regional planning agencies with state and local government and non-profit organizations. While the Team may implement specific HUD-funded recovery measures in the target areas, the Team partners will promote resiliency project results, strategies and tools in these target areas and throughout the entire state.

Exhibit D – Need

Commonwealth of Massachusetts

ExhibitDNeedMA.pdf

Link to DropBox/Exhibit D:

<https://www.dropbox.com/sh/da97xghx59d3rqy/AACNNT80cLugvnN7JG3UP6Y8a?dl=0>

Factor 2 – Need / Extent of the Problem

Subfactor: Unmet Recovery Needs and Most Impacted and Distressed

Unmet Need in Target Areas and Beyond

All of MA is considered a target area for resiliency planning under this application. In addition, specific target areas for HUD funding (see Exhibit B) are Oak Bluffs on Martha's Vineyard; Shelburne Falls and Charlemont in the Deerfield River watershed; and Springfield, in Hampden County and in the Connecticut River watershed, of which the Deerfield is a tributary. Oak Bluffs experienced a destabilization of its coastal ecosystem and a breakdown of critical coastal infrastructure such as sea walls during Hurricane Sandy. Extreme precipitation during Hurricane Irene caused Shelburne Falls to be impacted by the intense river flows in the North River (tributary to the Deerfield River), which flooded the village's water supply wells and threatened to undermine the wells' stability. Charlemont was also affected by the high river flows in the Deerfield River watershed during Hurricane Irene and saw a breakdown of public infrastructure with damage to culverts and roadways (Route 2), and destabilization of the surrounding floodplain. In Springfield, hundreds of houses were destroyed and damaged, areas were de-vegetated, and other municipal and commercial holdings were damaged during five of the declared disasters. Details of target area unmet recovery needs are in Exhibit B.

Helping communities recover from disasters by addressing existing damage is the first step in addressing unmet recovery need, but we must go further. MA communities are often supported by infrastructure more than 100 years old that is in desperate need of repair and replacement and designed using outdated estimates of precipitation and flooding. Also, the natural landscape has been significantly modified. Rivers have often been channelized, placed in culverts, and completely disassociated from floodplains. This has compromised their structural integrity and fluvial geomorphology, and increased flooding and flashiness, even during smaller storm events. Fragile

coastlines have been developed upon, compromising salt marshes and dunes that provide natural habitat and protect communities from offshore wind and storm surges. Climate change poses an added risk to infrastructure, housing, environmental and economic well-being.

Unmet need across the state - in particular along the coast, in riverine corridors such as the Deerfield River watershed, and in our aging cities such as those in Hampden County - includes the need to upgrade existing crumbling infrastructure and design replacements that can accommodate future changes in climatic conditions so that residents, businesses, and their communities will be protected. We need to restore rivers and floodplains, stabilize river banks, plant trees, and conserve land to avoid the devastation to environment, infrastructure, and economy experienced by communities in Franklin County during Hurricane Irene. At that time, streamflows in the Deerfield River blew out culverts, washed out sections of Route 2, and created a transportation nightmare for low- and moderate-income families trying to go to work, buy food, and bring their children to school. Aged housing, designed using building codes that are now outdated, are in vulnerable areas and need to be replaced or rehabilitated. New or replacement housing in Springfield and Hampden County must withstand extreme winds, be energy efficient for heating and cooling, and be sited outside of flood-prone areas. We need to consider coastline development and conservation, and develop strategies such as providing protective infrastructure, incentivizing the elevation of structures and their utilities, encouraging property owners to move from high-risk locations, and conserving land that provides protection. With an opportunity to address these and other unmet needs using HUD funds, MA would jump-start local, targeted efforts at restoring life to normalcy and creating resilient neighborhoods.

Most Impacted and Distressed

Low income and vulnerable populations disproportionately suffer the effects of extreme events, are least-equipped to adapt, and rely more heavily on government for support and relief. Springfield is particularly vulnerable because of its large percentage of low-income and vulnerable populations, communities of color and immigrants, housing stock that is aged with properties that have deferred

maintenance and need repair, densely populated neighborhoods located at low elevation on the Connecticut River, small business owners that lack the resources to stay afloat after a disaster event and with limited capacity to take on recovery debt, and residents who are disproportionately impacted by health conditions. Coastal communities like the Oak Bluffs target area exist all across the MA shoreline and old crumbling infrastructure, dense populations, and historic structures make them particularly vulnerable to extreme events and coastal storms. Details of most impacted and distressed characteristics of target areas are in Exhibit B.

While MA is a wealthy state, poverty levels have increased steadily over the past few decades (http://www.massbudget.org/report_window.php?loc=From%20Poverty%20to%20Opportunity.html) across the state. 19% of the population in Hampden County, where Springfield is located, is below the poverty level, as does 21% of Suffolk County, where Boston is located. 25 years ago, nearly 20% MA residents were poor or near poor (with incomes <200% of poverty level). Today, that statistic has increased to about 25%. The state's child poverty rate rose from 9% in 1970 to 16% in 2013. This nearly doubles if children who are near poor are counted. Children of color are at particular risk for economic vulnerability; almost half of Black children and two-thirds of Hispanic children are poor. About 20% of MA families are headed by a single female; those families with at least one child age 3 years old or younger are more likely to be in low wage jobs. MA residents are also burdened by high rent as a % of their household incomes; in Hampden County, 45% of renters pay 35% or more of their household incomes on rent. The tourist-dependent areas of MA, where property values are high and wage low, are even harder hit by high rents: in Dukes County, on Martha's Vineyard where Oak Bluffs is located, that figure is 47% and in Barnstable County (Cape Cod), that figure is a staggering 50%.

Throughout MA, there are areas of poverty and other circumstances that make it nearly impossible for the population to face the challenges of disaster recovery and climate change preparedness without assistance. The MA Team includes partner Valley Opportunity Council to ensure that we work with affected communities to help them address these issues. With HUD funds to fill

gaps, we will revitalize local economies, enhance protection of the built environment, and preserve and protect public health and safety. MA's resiliency plan would enable communities such as Springfield to be robust, sustain thriving populations and businesses, and become more resilient to changing climatic conditions. Phase 2 projects supporting recovery of unmet needs will be evaluated based on an analysis of risk, cost, ability to address issues, and whether they are supported by target area communities. Projects addressing climate change will include analyses of climate change scenarios and selection of designs that are protective, cost-effective, and expected to endure over the projects' lifespans, taking into consideration their use and function. Some projects, like playgrounds and parking lots, may experience a lower risk of impact and need less protection incorporated into their designs. Projects providing critical services such as power generation, treatment plants, transportation, schools and hospitals, may need to address more extreme scenarios of future climate change to minimize risk and maintain the health and safety of communities, their populations and their built and natural environments. These solutions would be selected in consultation with the MA Team's technical experts, who are involved in developing the latest climate change science and risks.

Subfactor: Narrative on Post-Disaster Threats and Climate Change

Post-Disaster Threats and Climate Change – Observations and Predictions

MA's landscape ranges from densely populated cities to rural agricultural lands, and from very affluent neighborhoods to entire municipalities consisting of low income communities. The state has experienced an increasing frequency and intensity of extreme weather. Between 2011 and 2013, six federally declared disasters ravaged the state – coastal storms, land-bound hurricanes, snow storms, and tornadoes – and they were particularly devastating to low- and moderate-income communities, including our target areas. Along the coast, winter storms and hurricanes, sea level rise, and localized land subsidence have put our development, infrastructure, human health, and ecosystems at incredible risk. Inland, extreme precipitation, with resulting record-breaking river flows, and an upsurge in tornadoes have compromised the structural integrity of buildings, bridges and roadways; destabilized

riverine systems and infrastructure like culverts and bridges; and disrupted livelihoods and local economies. These areas, after being hit several times by different disasters, within a relatively short span of time, do not have the economic base to recover from and mitigate damages on their own.

Although FEMA investments helped significantly, the funds did not cover the full cost of repairing and restoring the vast damage. Also, the CDBG-DR funds that were allocated did help in addressing more immediate needs of the communities; again, however, the damages far exceeded the assistance received (Exhibit B). Combined with impacts from climate change, costs to recover from extreme events could be prohibitively high. The average annual cost of climate change impacts to the U.S. could reach 2.6% of the gross domestic product by 2100 (DropBox/Exhibit D/Ackerman et al 2009.pdf). The MA Team is committed to developing projects that address remaining post-disaster needs as well as threats due to climate change. Team Members have been addressing these issues through the release of EEA's 2011 Climate Change Adaptation Report, which evaluated strategies to adapt to predicted climate change (DropBox/Exhibit D/MA EEA 2011.pdf), and MA's Coordinated Climate Preparedness Initiative; Exhibit F includes some of this initiative's projects as leverage. The time is opportune to envision and create building blocks for a more resilient MA with anthropogenic and natural systems better equipped to cope with extremes and new climate change patterns.

Temperature. According to the most recent U.S. National Climate Assessment (Melillo et al, 2014 at <http://nca2014.globalchange.gov/report/regions/northeast>), increases in temperature and heat waves, will pose a challenge to MA and its people, infrastructure, ecosystems, and agriculture. The urban heat island effect will be especially magnified in the highly populated and developed Northeast. Increased temperature will result in poor air quality; heat stress and health risk to vulnerable populations such as the elderly, the young, those with respiratory conditions such as asthma, and the economically impoverished; failure of a key lifeline such as electricity, and; greater infestation of pests and occurrence of vector borne diseases. MA has temperature records dating back almost 200 years. Since 1970, average temperatures have increased nearly 0.5°F per decade, # of days above 90°F nearly

doubled, and snowpack has decreased. Winter temperatures increased faster than average temperatures. By 2100, MA is predicted to have 30-60 days with temperatures greater than 90°F and an increase of 5-10°F in average temperature (DropBox/Exhibit D/Frumhoff et al 2006.pdf, Frumhoff et al 2007.pdf). Projected extremes in temperature will place a disproportionate burden on low- and moderate-income populations; MA needs projects that address rising temperatures and can lead to solutions for low- and moderate-income populations that are not able to afford air cooling, especially those residing in urban areas where the heat island effect is predicted to be most profound.

Precipitation. According to the most recent U.S. National Climate Assessment (Melillo et al., 2014), coastal and inland flooding, and intense precipitation events will also pose an increasing challenge to the State. Impacts could include decreased snow cover, resulting in lower peak spring flows and negative impacts to water supplies and winter recreation, and could also include greater runoff and associated stormwater issues including impacts to water quality, increased flooding and impacts to structures and public health. Patterns of precipitation amount, frequency, and timing are already changing. Data recorded by the US Historical Climatology Network indicates that precipitation in the Northeast has increased 5-10% since 1900. In the past few decades, more precipitation has fallen during winter as rain (DropBox/Exhibit D/Frumhoff et al 2006.pdf, Frumhoff et al 2007.pdf, Hayhoe et al 2006.pdf, Keim et al 2005.pdf). In MA, except Cape Cod, the most recent 30-year normal precipitation is the highest since records started in 1838 (DropBox/Exhibit D/MA Water Resources Commission 2008.pdf). Over the past 50 years, average precipitation increased by 3.92 mm/year. Extreme precipitation in northern coastal New England (including MA) increased since the 1970s (DropBox/Exhibit D/Douglas and Fairbank 2011.pdf). In the last 10 years alone, increased numbers of hurricanes and storms have repeatedly brought record rains and floods with the worst recorded floods since the 1938 Hurricane, and 8 of 30 long-term USGS streamgages breaking records for peak flow.

Precipitation patterns are predicted to include higher-intensity events, increased winter precipitation mostly in the form of rain, and more droughts which could profoundly impact our

infrastructure, businesses, public health, water supplies, recreation, and ecosystems. Even under current climatic conditions, impacts from extreme events are costly. Flooding of the MBTA subway system in Boston in 1996 resulted in more than \$92 million in damages (DropBox/Exhibit D/Ruth et al 2007.pdf). Extreme precipitation can overburden urban stormwater and combined sewage systems, causing flooding and water quality violations in waters near our low- and moderate-income populations, such as the Springfield target area. It also increases runoff that pollutes beaches and closes shellfish beds, threatening the attractiveness of MA as a tourist destination and shutting down food supplies for the local population in places such as the coastal Oak Bluffs target area. The Shelburne Falls target area's water supply was impacted by riverine flooding and scouring, while culverts and important roadways were washed out in Charlemont by the intense precipitation of Hurricane Irene.

Sea Level Rise and Coastal Surge. According to the IPCC (Fifth Assessment, 2013 at <https://www.ipcc.ch/report/ar5/wg1/>), the rate of sea level rise since the mid 19th century exceeded the mean rate during the previous two millennia. Between 1901 and 2010, sea level rose by 0.62 feet. This trend is expected to continue at an increasing rate over this century. Global projections for the US (Melillo et al., 2014 and DropBox/Exhibit D/Parris et al 2012.pdf) predict an increase of up to 6.6 feet by 2100 in the Northeast. More locally, MA's 1,500 miles of coastline faces a substantial rate of sea level rise and erosion, and is naturally subsiding. Our region is identified as the "Northeast Hotspot" (DropBox/Exhibit D/Sallenger et al 2012.pdf). In the past 40-60 years, sea level rose 3-4 times faster than it did globally and relative sea level in MA rose 9" from 1921 to 2006. This trend is predicted to continue at an increasing rate. Sea level in MA rise could be 6.6' by 2100 (DropBox/ Exhibit D/Sallenger et al 2012.pdf) as sea surface temperatures are predicted to increase 8°F and coastal areas are expected to experience greater storm surges. Superimposing storm surges onto increased sea levels further increases vulnerability of low-lying coastal areas, subjecting them to extensive flood damage.

Boston is predicted to have the 4th highest risk to asset exposure due to sea level rise. Asset exposure from a mid-century 100-year storm event is estimated to exceed \$400 billion while current

asset exposure to a 100-year storm is estimated at \$77 billion (DropBox/Exhibit D/Lenton et al 2009.pdf). With the dense population and development that exists along the coastline, and the prevalence of antiquated infrastructure, impacts from climate change will only be compounded without efforts to fortify, buffer or move structures to less vulnerable areas. Evacuation costs in MA from sea level rise and coastal surge could range between \$2 billion and \$6.5 billion, depending on the severity of the storm event (Ruth et al 2007.pdf). These costs will place a disproportionate burden on vulnerable populations including low- and moderate-income areas such as our target areas, elders living on fixed incomes, and workers who cannot access alternative housing or transportation during disasters. In addition, sea level rise will have adverse effects gradually over time. For example, saltwater intrusion in coastal areas can contaminate water supplies and corrode pipes and other infrastructure. On Cape Cod, salt water is already intruding below the groundwater lens and into water supply wells, thus decreasing the quantity of freshwater available for human consumption and natural habitats.

Addressing Threats and Hazards and the Tie-Back to Unmet Recovery Needs

The MA Team will select projects that enable communities to recover from and prepare for effects of climate change, including the latest predictions on increased intensity of precipitation, sea level rise, coastal storm surge, high winds from tornadoes and hurricanes, and temperature increases. Although we will focus on low- and moderate-income areas, particularly our target areas, we are confident that in addressing the post-disaster threat and hazards in these areas, HUD funding will provide a benefit to the entire Commonwealth. Through leveraged and aligned programs, we can take the learning and approaches piloted in the target areas and adapt them across MA.

In rural riverine corridors and built-out urban areas, we will work with communities to aid recovery from past damage and manage future increased precipitation and its effects on water quality and flooding. In the Springfield, Charlemont, and Shelburne Falls target areas, and in other areas including western MA, we will seek to recharge water, prevent runoff, stabilize rivers, streams and

floodplains; and repair and replace damaged or undersized infrastructure. For example, we are currently working with urban leaders to implement green infrastructure for stormwater control in Springfield, Chicopee, and Holyoke in Hampden County in partnership with three grassroots groups.

In areas affected by Hurricane Sandy, including the Oak Bluffs target area which suffered coastal flooding, damaged roads, and eroded beaches, we will work to update and upgrade key coastal infrastructure such as sea walls and tide gates so as to better protect economic centers and residential areas located immediately behind these structures. In addition, the Commonwealth plans to prioritize and enhance natural buffering capacity by creating and restoring habitats like salt marshes, barrier beaches and other wetlands and expand green infrastructure approaches so as to establish systems that work with nature. We will develop new tools to engage the public in discussions about predictions of complicated sea level rise computer models. We will look at innovative examples of how to accommodate flood waters in an urban setting, such as Boston's Living with Water Competition.

The MA Team will also help communities develop resilience to hurricanes and tornadoes like those which recently resulted in damage to local economies, the environment, housing, and permanent public infrastructure. We will look for projects that make communities more resilient so they can withstand repeated and more severe future events. With support from the Centers for Disease Control and Prevention, DPH has been conducting a multi-year outreach effort and assessment to better understand the state of public shelters (or safe havens where residents can gather during extreme events) and communication strategies in each of the MA 351 municipalities. At the same time, DOER has been awarded grants for energy resiliency. Combining efforts like these in low- and moderate-income areas would enable us to identify where shelter is needed and then ensure that it is cost-efficiently heated and cooled through the addition of energy resilient features.

The resiliency of Massachusetts communities, environment and economies -- their ability to accommodate impacts from both existing natural hazards and future climate change -- will require planning, collaboration, and action, some of which has begun at the state, regional and local levels.

Exhibit E – Soundness of Approach

Commonwealth of Massachusetts

ExhibitESoundAppMA.pdf

Link to DropBox/Exhibit E:

https://www.dropbox.com/sh/5csxkn0vzdtox5f/AACoIEeaEy_fhpap8DGUYffca?dl=0

Exhibit E – Soundness of Approach**Stakeholder Consultation and Involvement**

To prepare for this Phase 1 application, the MA Team reached out to local, state, federal, nonprofit, university and private stakeholders (see Attachment D). Consultations took the form of emails, phone calls, data and information sharing, site visits, and meetings. We reached out to project partners, including the regional planning agencies (MAPC, FRCOG, PVPC, BRPC, and the Martha's Vineyard Commission) that are on the front lines, communicating with the communities. We also reached out to the individual communities. We met with Deerfield Watershed Creating Resilient Communities, an *ad hoc* group of local political leaders, residents, scientists from UMass, engineers from NRCS and many others, to learn about the many issues the Deerfield River watershed area has been addressing since the catastrophic events of Hurricane Irene. Following up on leads from regional planning agencies, MEMA, MassDOT, the MA State Geologist, and even newspaper articles detailing the ravages of particular disasters, we called and met with communities hoping to better understand the issues they faced during and since the disasters. We contacted officials from Oak Bluffs, Vineyard Haven, Charlemont, Fall River and dozens of other communities with needs that did not meet the HUD threshold criteria. We hope to qualify some of these as target areas for HUD funding in our Phase 2 application.

MA held two public hearings (Attachment D), one in western MA and another in eastern MA, to learn about impacts from disasters, broad visions for resilience in MA, and specific suggestions on particular site-specific issues. We also held two public comment periods (Attachment D), one to solicit suggestions as the application was being prepared and another to receive public comments on the draft application.

Of particular note is our close coordination with the City of Springfield, another eligible applicant to HUD's National Disaster Resilience Competition. The MA Team has benefited from teleconference meetings with the City, and from Springfield sharing its unmet recovery needs information. We are partnering on each other's projects and look forward to a strong and coordinated relationship between the two teams especially as they affect vulnerable populations.

Concept for Resiliency

MA is eager to move toward the next step of climate change resiliency and preparedness. As we look to the future, we envision a state that has infrastructure and housing built to withstand changing climatic conditions especially extreme events; local residents living and working in areas designed to withstand increases in precipitation, flooding, and temperature; coastlines where communities are "living with" water; natural systems with thriving habitats, unimpeded rivers and streams meeting the ocean with fully-functional floodplains and buffers; and a government with robust policies, incentives, and outreach/education programs designed to meet the needs of local communities and their vulnerable residents. We envision a state in which the diverse interests and needs of MA communities are met, whether they are urban or rural, eastern or western, coastal or inland.

While addressing unmet recovery needs in target areas will provide a much needed jump-start to improvement of local conditions, an important aspect of our vision is a forward-looking approach to meeting future challenges of climate change head on, ensuring that the extent and amount of damage occurring from disasters such as hurricanes, storms, and tornadoes is minimized in the future. We are intent on planning and managing impacts of climate change before they occur and feel this is preferable to reactive responses implemented after an impact takes place. This approach has the potential to reduce costs, minimize or prevent impacts to public health and safety, and minimize damage to crucial natural resources and built infrastructure. Both management and planning should be flexible, dynamic, and adaptive, and strategies must be continuously revisited and revised. The MA Team has proven that it is skilled in just this type of approach.

It is imperative to have robust natural and anthropogenic systems that can withstand weather extremes and long-term changes in climate. To that end, the MA Team is extremely interested in fostering community-focused adaptation strategies with visioning, data and modeling, policy analysis, financial incentives, and appropriate regulatory structures provided at the state level. We have found that there is a tremendous need for this and we will continue our commitment to an open process to identify additional target areas and solidify projects ideas.

Project Ideas

In addition to considering the entire Commonwealth as its target area, the MA Team strategically selected four target areas for potential HUD funding for inclusion in Exhibit B: Springfield, Oak Bluffs, Shelburne Falls (Buckland portion), and Charlemont. Together, these target areas have unmet recovery needs from all six federally declared disasters, ranging from snowstorms to hurricanes causing inland/riverine damage, to hurricanes causing coastal damage, to tornadoes. This diversity of target areas will enable us to develop a robust and comprehensive Phase 2 application that addresses all of these issues. During outreach for the Phase 1 application, we identified these target areas as well as a number of potential projects to include in our Phase 2 application. This engagement was enlightening and we plan to continue it, even before HUD announces its decisions regarding the Phase 1 applications, to identify additional target areas and to shape the best projects for our Phase 2 application.

MA's ability to adapt to climate change will be improved through robust science, data collection and analysis; inclusion of climate change in the criteria and evaluation of programs; application of a climate change lens to current planning efforts; examination of funding opportunities and regulations to determine whether they should consider climate change; and continuation of current efforts to increase resilience and decrease vulnerabilities in a wide variety of public and private assets. The following are some project ideas to promote resiliency in MA.

Although Massachusetts does have counties, they do not exert any real regional government authority. The Regional Planning Agencies (RPAs), some with regulatory authority, work at a cross-community scale to assist communities with their developmental, transportation, environmental and other issues. The MA Team proposes to set up a ‘**State-RPA Collaborative**’ for a structured bottom-up engagement and prioritization effort to promote a clear understanding and communication of local resiliency needs and a pooling of resources, equipment, and subject-expert staff to achieve economies of scale. Many communities are low- and moderate-income, with a limited tax base, and often without paid staff, so sharing these resources among RPAs and with neighboring towns would help meet many local needs. Working with grassroots partners and RPAs, we would engage target areas in **Participatory Project Selection**, setting aside some funding so that they can identify areas most in need of those funds. This would empower the communities as they build resilience from the ground up.

Post-Hurricane Sandy, the development community gained heightened awareness of the vulnerability of their properties to sea level rise, storm surge, and riverine flood waters. To engage this community and begin the process of making existing buildings more resilient to flood waters and coastal surges, we will establish a ‘**Resilient Building Competition**’. This would be modeled after the CZM-funded Living with Water Competition in Boston, and other similar efforts, and will provide developers and property owners an opportunity to put forth creative ideas on how to ‘live with water’ rather than to simply fortify against flooding.

The MA Team is committed to implementing EEA’s Department of Energy Resources **Community Clean Energy Resiliency Program**, providing clean energy resilience grants to municipal/regional entities to harden critical energy services using clean energy technology, including solar, electric storage, combined heat/power, renewable thermal, fuel cells, district energy, and micro grids. Beneficiaries of the program include municipalities, hospitals, regional wastewater treatment utilities, and electric cooperatives. Related to this program, the MA Team would like to develop an **Energy Justice Program** that enables low- and moderate-income populations to gain access to the

benefits of clean energy. Clean energy can help to reduce heating and cooling costs but its upfront costs are often a barrier to installation. This type of program would help to lower those barriers as well as provide economic security through reduced utility bills.

The MA Team is also committed to instituting the **Green Infrastructure for Coastal Resilience Grant Program**. EEA's Office of Coastal Zone Management (CZM) is administering grants to provide municipalities and nonprofits with financial and technical resources to advance the understanding and implementation of natural or nonstructural approaches to mitigating coastal erosion and flooding problems. Complementing this programs, we would also like to create a '**Green by the Stream**' program to encourage green infrastructure and natural buffering of waterways and other inland areas, perhaps in the form of grants to communities. Hurricanes Irene and Sandy and many other smaller storms have all highlighted the need for natural buffers to protect our built environment. It is imperative that we prioritize, protect, restore, and construct green infrastructure techniques to buffer key infrastructure and dense population areas. A green infrastructure approach has multiple benefits of protecting upland and riparian areas, enhancing habitat and ecological values, and creating recreational and aesthetic opportunities for local citizens.

We are very interested in creating a '**Plant a Tree Program**' to increase tree planting in rural and urban areas. This project could engage local businesses, municipalities, federal agencies, and even school children. In the rural areas of Hampden County and most impacted and distressed areas of the Deerfield and Hoosic Rivers watersheds (Mohawk Trail Woodlands Partnership), this project would focus on forest restoration, building stream and river buffers in farms, and an urban forestry program. The project could benefit from MA DOER's study of the establishment of a local wood pellet manufacturing plant to create that market, boost the local economy, and supply low-cost fuel to heat local schools and residences. In urban areas, including Holyoke, Chicopee, and Springfield in Hampden County and other small manufacturing cities, this project would focus on implementing tree

planting projects in target urban basins to provide relief from urban heat island, reduce winter heating costs, and reduce water pollution from stormwater and combined sewer overflow discharges.

Another project idea is to create a statewide interactive **Data and Mapping Tool**.

Municipalities in MA, especially low- and moderate-income communities, are in need of tools that will better help them understand the location of their various natural and built environment, downscaled climate change predictions, the extent of the impact of climate change on their lands, and a way to visualize how mitigation actions will help alleviate future damage and impacts. We would like to develop tools that translate technical information, such as maps depicting the results of sea level rise modeling being conducted for MassDOT, into user-friendly products that can be used by others. This will help developers and others consider risk of various development alternatives. For example, the MA Team is exploring the extension of the Climate Change Science Clearinghouse (CCSC) tool that NESCAUM is creating for the state of New York. The broader goal is to have all of the Northeastern states to utilize a unified tool to allow for true regional and cross-boundary planning. This approach received support at the Coalition of Northeastern Governor's meeting last December.

We would like to **Sharpen the Science** by updating climatic and hydrologic databases; developing downscaled temperature and precipitation predictions and climate scenarios; and collecting other scientific information that will help policy-makers, developers, and municipal officials make appropriate decisions regarding the risks of climate change impacts.

The MA Team is committed to implementing the **Coastal Community Resilience Grant Program**. These CZM-administered grants provide municipalities with financial and technical resources to advance new and innovative local efforts to increase awareness of climate impacts, identify vulnerabilities, and implement measures to increase community resilience. Projects must implement one (or more) of these four StormSmart climate adaptation actions: 1) conduct public education and awareness or other communication initiatives, 2) assess vulnerability and risk, 3) identify and implement management measures, standards, or policies, and 4) redesign to accommodate

changing conditions. Other **Incentives for Coastal Communities** would encourage property owners to reduce the risk of coastal inundation by creating funding opportunities to promote free-boarding or elevating buildings, move buildings, or buy out properties at risk.

The MA Team would like to support the **Metro Mayors Coalition**, a groundbreaking coalition made up of 13 communities in Greater Boston. Through this voluntary forum area municipal officials exchange information and create solutions to common problems. MAPC helped to establish Metro Mayors in 2001, and provides staff support and financial administration. Group members represent more than 1.2 million constituents and include mayors and managers from Boston, Braintree, Brookline, Cambridge, Chelsea, Everett, Malden, Melrose, Medford, Quincy, Revere, Somerville and Winthrop. Most of these communities have low- and moderate-income populations. Recently, the Metro Mayors have banded together to address their common, regional resiliency issues. Boston Mayor Marty Walsh is scheduled to kick-off this effort at a public event in April 2015.

Assisting communities to recover from past disasters and incorporate resilience into their designs is a priority of the MA Team. A commitment of this application, EEA's **Dam and Sea Wall Repair or Removal Fund** is a grant and loan program for the repair and removal of dams, levees, seawalls, and other forms of inland and coastal flood control. Preference is given to projects that: improve public health and safety; protect other public infrastructure; recognize the potential impact of climate change and improve resilience; improve or expand use of naturally occurring systems; fit into a larger comprehensive plan to improve the environmental condition, complementing other work ongoing in the local watershed; address a structure in a community with an environmental justice population; and indicate a commitment to equity of opportunity through its Supplier Diversity Form. We are strongly interested in expanding this **Fix it First Program** to provide target areas an opportunity to receive funding to make other repairs to infrastructure, environment, and housing, thus facilitating recovery from past disasters and ensuring resiliency against future events.

With funding from the U.S. Centers for Disease Control and Prevention, MA Department of Public Health (DPH) assessed the capacities of local health departments to address the consequences of climate change and made recommendations for local health departments to adapt to climate change (see DropBox/Exhibit E/ MA DPH 2014.pdf). The MA Team would like to support the next steps of DPH's **Outreach and Education** to municipal health officials and local boards of health, with a particular focus on reaching out to vulnerable populations.

We intend to work with local partners to provide education, outreach, and access to shelter, equipment, and services that would build resiliency in **Environmental Justice** communities. This will include efforts related to tree planting, Energy Justice and public health outreach and education. Other project ideas include developing **Guidance on Historic Building Resiliency** to ensure that buildings constructed during past climatic conditions are able to withstand future conditions, and **Collaboration with the Insurance Industry** to explore the relationship between resilient communities and insurance availability and affordability.

Subfactor: Potential Co-Benefits

The approaches highlighted above showcase themes and climate change adaptation strategies that resonate across multiple sectors. They have multiple benefits across political jurisdictions, crossing over many human-related sectors, and natural systems. Some of the approaches address climate change adaptation and can also be considered climate change mitigation strategies because, in addition to contributing to providing increased resilience and preparedness to climate change, they concurrently achieve reductions in the greenhouse gas emissions that contribute to the problem of climate change. Other strategies have cross-cutting features that preserve, protect and restore natural habitats and the hydrology of watersheds. These strategies not only benefit natural resources and habitat, but can also play a critical role in protecting and increasing resilience of key infrastructure sectors, human health, and the local economy. For example, green infrastructure for stormwater treatment and control represents a regional approach to urban environmental restoration wherein

multiple target cities within the same watershed (e.g. Holyoke and Chicopee on the Connecticut River) can have cumulative benefits by mitigating impacts from flood events, and gain secondary benefits such as reducing stormwater pollution and treatment costs, energy costs, urban heat island effects, and improving air quality and resident health. The approaches presented above help to improve the socio-economic status of vulnerable populations and enable a better quality of life for the residents of low- and moderate-income communities. They foster more vibrant communities through better planning and foresight that addresses health issues, stormwater and other pollution impacts, reliance on local power, and enhanced recreation opportunities.

Subfactor: Addresses vulnerable populations

Structures such as buildings, roads, bridges, and dams that exist along rivers, the coastline, and in other vulnerable areas are more likely to be impacted from sea level rise and storm surge. Low income and other vulnerable populations will disproportionately suffer the effects of extreme events, be least-equipped to adapt, and rely more heavily on government for support and relief. Great risk to local governments lies in their fiscal well-being. Damage to private property due to climate extremes may reduce the municipal tax base and, at the same time, call for an increase in services for vulnerable populations, emergency response, and public and private infrastructure maintenance upgrades or replacement. In areas with low- and moderate-income residents, this issue will be further exacerbated.

In general, some residents will be more susceptible to the effects of climate change, and adaptive change will be more difficult for them. Whether by virtue of economic status, social capacity and resources, health, age, or geography, adaptation efforts should include planning to meet the unique needs and conditions of the state's most vulnerable populations – including those with limited resources to take protective and adaptive measures and to recover after losses, and those coping with existing chronic illnesses that could be aggravated by the expected climatic change. Children, the elderly, the disabled, and low- and moderate-income groups, in particular, should be considered in any adaptive plan. Other vulnerable populations include immigrants; the homeless; un- or under-insured

people; residents with increased exposure to ambient asthmagens; residents of older or substandard housing; people who are geographically isolated from health care services; people with certain pre-existing conditions, especially asthma or lung dysfunction or compromised immune systems; and outdoor laborers such as farm and construction workers.

Many of the disasters that this application addresses have hit areas of low- and moderate-income. The year-round population in Martha's Vineyard is typically lower income and economically less advantaged than the seasonal population that visits the island in the summer. In fact, Duke's County, of which Martha's Vineyard is a part, is one of the poorest counties in the state.

Hampden County has levels of poverty greater than the national average and unemployment rates equal to the national average. Of the damaged and destroyed Hampden County structures, 37% were occupied by renters, 42% were uninsured and 30% of the occupants qualify as low income. Without assistance for recovery, the impacted communities cannot effectively recover from the events. Franklin County, where the Deerfield River watershed is located, has a poverty level greater than the state average. It is very clear that these areas are in severe need of assistance to rebuild and make them more secure and resilient to future such events. The MA Team, through the various programs and approaches highlighted above, is eager to partner with these communities to provide enhanced and focused attention that will address their short- and long-term needs.

Current Commitment to Resilience

With our relevant backgrounds, The MA Team is able to implement programs that will enhance local economies, improve environmental stewardship, protect and preserve public health and safety, protect infrastructure, and address the needs of particularly vulnerable populations who may not have the ability to get out of harm's way. Our current commitment to resilience includes many projects that are currently underway in the Commonwealth. Several ongoing efforts are listed in Exhibits F and G and provide a solid foundation for implementing our vision for resilience.

The MA Climate Change Adaptation Report (<http://www.mass.gov/eea/air-water-climate-change/climate-change/climate-change-adaptation-report.html>) has been guiding the state since it was published in 2011. Key strategies of the report are: perform risk and vulnerability assessments; develop up-to-date and accurate information, models, and decision-support tools; minimize impacts through effective planning and management; implement measures that preserve, protect and restore natural habitats and hydrology; and assess and enhance emergency management tools and capabilities. The report also provides discipline-specific strategies such as protecting ecosystems and maintaining ecosystem health and diversity for protection of natural systems, including climate change in building practices, and using natural systems for the protection of infrastructure. Since then, the Commonwealth has prioritized climate resilience and preparedness actions that address impacts on our transportation and energy assets, built and natural environments, and public health. Through a state-wide framework of prioritization and allocation of resources supporting both local and regional implementation efforts, these ongoing actions being coordinated by EEA range from assessments of assets and vulnerabilities, adaptation planning, on-the-ground fortification of infrastructure and assets, and. Actions also include the development of new grant programs to assist communities, policy changes to better utilize best available information, trainings for practioners dealing with these issues, and investments in the resources and data necessary for us to better understand and address our risks. A continuation and extension of these programs will need sustained horizontal coordination amongst state agencies as well as vertical coordination and collaboration across all levels of government, affected populations, and with key stakeholders.

Form HUD2995

The MA Team has included a Form HUD2995, Certificate of Consistency with Sustainable Communities Planning and Implementation which verifies that this application meets program requirements and supports local Preferred Sustainability Status (DropBox/Exhibit E/PreferSustainCommStatus.pdf).

Exhibit F – Leverage

Commonwealth of Massachusetts

ExhibitFLeverageMA.pdf

Link to DropBox/Exhibit F:

https://www.dropbox.com/sh/k1x7vq7yn10hkcy/AACEEuEnxHpSV1Kyz2yK_GGGa?dl=0

Exhibit F – Leverage**Outcomes**

Longevity and Magnitude. MA is committed to the recovery of communities from disasters and to strengthening their resilience and preparedness to climate change. In developing resiliency solutions, the MA Team will seek long-lasting solutions that require little ongoing maintenance. An example is the U.S Army Corps of Engineers' Charles River Natural Valley Storage Area which involved the acquisition and permanent protection in the 1970s of 17 scattered wetlands in the middle and upper watershed (8,103 acres) for the purpose of flood protection.

Co-Benefits. DOER's Community Clean Energy Resiliency Initiative promotes clean energy and reduction of greenhouse gas emissions. As an example of a leveraged green infrastructure project with co-benefits, EEA and other members of the MA Team, with local grass-roots environmental justice partners, are re-planting trees in the Springfield target area and in surrounding low- and moderate-income cities of Chicopee and Holyoke to aid in the recovery of urban trees lost in past disasters. Team members completed extensive community engagement including public meetings and door-to-door outreach about tree planting benefits in affected neighborhoods and have used an efficient method to re-plant 15,000 trees. This approach to urban environmental restoration offers co-benefits by alleviating flooding, water pollution, treatment costs, energy costs, urban heat island effects and air quality impacts. A tree pit reduces stormwater equivalent to the reduction of 1,265 square feet of impervious surface during a 1" storm (DropBox/Exhibit F/U.S. EPA 2015 draft.pdf). Studies show the relationship between urban tree canopy and household heating and cooling costs including one that showed that a 4% reduction in urban tree canopy would raise home cooling energy use by 2.9% (DropBox/Exhibit F/Potyondy 2013.pdf). Also, EEA's Department of Energy Resources (DOER) is completing a comprehensive assessment of the feasibility of locating a wood pellet plant in the region.

Sustainability. The MA Team will work with the target areas and throughout the state to develop strategies that encourage sustainability. The example above demonstrates how a community tree planting effort is both environmentally sustainable by providing water quality benefits, and flood and storm hazard mitigation; and financially sustainable by reducing heating and cooling cost, providing low cost heat options (via local wood pellets harvested to improve forest resilience) and increasing local job opportunities in the forestry sector.

Vulnerable Populations and Opportunity. The target areas in this application represent two tourist destinations, one rural hill-town, and one industrialized area. The MA Team will look for projects that address past losses and future threats, and also those that provide an opportunity to stimulate the economy and household wealth creation. For example, as a follow-up to the MassDOT survey of 1,000 culverts in the Deerfield River watershed, fixing and upgrading of the culverts and the surrounding supporting landscapes would result in new construction employment and other types of jobs; reduced risk of economic disruptions; greater reliability of access to important economic and town centers. Tree planting and green infrastructure installation could result in more forestry, engineering, public works, and planning jobs.

Success and Evaluation Measures. The MA Team will develop meaningful measures that are relevant to local populations and based on best available information. We will measure success of the program by examining improvements in local circumstances such as employment opportunities, environmental conditions, and repaired infrastructure. But we will go well beyond that, looking for increased resilience of our vulnerable populations to the increasing frequency and severity of disasters that MA faces such as number of new green infrastructure projects underway; communities participating in clean energy programs; trees planted; stream miles with stabilized banks; culverts resized and replaced; and households at reduced risk of flooding. We will work with our communities to develop measures that are cost-effective, fair, responsive and easily understood.

Leverage

Partners. With the state as the lead applicant and 5 RPAs representing over 200 communities, our partners have considerable experience working with communities and organizations at the local level. We regularly work with environmental justice groups such as Nuestras Raices in Holyoke, Valley Opportunity Council in Chicopee, ReGreen Springfield, and Chelsea Collaborative. In addition, MA Rivers Alliance, MA Bays Estuaries Program, and The Boston Harbor Association are local organizations that have developed strong partnerships with residents and other organizations.

Co-Benefits and Cost Efficiencies of Financing. MA is experienced in using streams of public money innovatively to serve multiple purposes. It uses RGGI funds to pay for tree planting. The Natural Valley Storage Area project described above was developed to respond to local opposition to hard-scaped flood-proofing that would have damaged the environment. This alternative to a series of dams was more cost-effective to establish, requires no maintenance, and is a local recreational attraction. Improvement of the local beaches and roadways in the Oak Bluffs target area may encourage tourists who arrive by ferry to stay longer and spend some money before travelling to other towns on the Vineyard. Improvements to stream banks and floodplains in the Deerfield River watershed will help protect public water supplies, and enhance recreation and fishing.

Committed Leverage. Commitments at the state, regional, and local levels of government that broaden the reach of our resiliency objectives are evident through MA's recent multi-Secretariat initiative to enhance climate resiliency and preparedness. Committed leveraged resources, which far exceed HUD's threshold of \$250,000, are: *EEA agency DOER's Community Clean Energy Resiliency Program* to promote renewable energy in communities; *EEA's Dam and Seawall Repair and Removal Fund* to protect against flooding; and *EEA's CZM's Coastal Community Resilience Program* to encourage resilience in coastal communities to storms/sea level rise, and *Green Infrastructure Pilot Program* for flood control and storm surge reduction projects involving measures such as dune enhancement, marsh restoration. See Attachment B for documentation of this leverage.

Exhibit G – Long-Term Commitment

Commonwealth of Massachusetts

ExhibitGLongTermCommitMA.pdf

Long-Term Commitment

Major commitments on resiliency have been achieved throughout the state since Sept. 17, 2014.

State Commitment. MA prioritized climate resilience and preparedness actions and investments (Exhibit F), addressing energy resiliency, dams and seawalls, coastal resiliency, and green infrastructure. EEA's DOER invested \$25,829,933 (Attachment B) in energy resilience, awarding 19 grants to municipalities, hospitals, regional wastewater treatment utilities, and electric cooperatives. A \$611,000 grant to the Greater Lawrence Sanitary District for an organics to energy upgrade benefited nearly 200,000 people in MA and New Hampshire, including areas of low- and moderate-income. A grant of \$2,790,099 for co-generation to Baystate Health in Springfield benefited western MA. Seven percent of gross regional product generated in Hampden, Hampshire, and Franklin counties is attributable to Baystate Health, and jobs and earnings supported by Baystate represent nearly 11,000 households (<http://www.baystatehealth.org/Baystate/Main+Nav/About+Us>).

Regional Commitment. The Tri-Town water supply, jointly owned by the city of Braintree and the towns of Randolph and Holbrook received \$1,000,000 from EEA to reconstruct and fortify infrastructure at the Great Pond Lower Reservoir Dam, which had been rated in "poor" condition. The award (\$185,329 grant and \$814,671 loan at 2% interest) protected the water supply of about 77,500 residents across 3 communities. The borrowing demonstrates a strong commitment toward resilience by a regional entity.

Local Commitment. Three communities, Bellingham, Canton, and Gloucester each borrowed between \$312,000 and \$853,600 from EEA's Dam and Seawall Repair or Removal Fund to either reconstruct a drinking water supply dam or remove a deteriorated dam, preventing flood danger. In Gloucester, dam repair protected 60 townhouses of Gloucester Housing Authority, a water treatment plant and 644 students at O'Maley Middle School, all downstream of the dam.